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I. *Experiments and Observations on Bulbous Roots, Plants, and Seeds growing in Water.*
by Mr. William Curteis.

ABout three Years since, seeing some *Bulbous Roots* set in Glasses filled with Water in a Shop Window, and being told they would Flower in that manner, I immediately tried a couple of *Hyacinths*, which blowed very prettily the next Spring: it pleased me much to see that we could have such Things in a close Room in Town, without the help of a Garden to produce them, having lately come out of the Country, and being a Lover of Flowers; wherefore I began to think if I could contrive a Method to make a Pot full blow together, with a mixture of several sorts of Flowers with a variety of Colours, it would be an Improvement.

The next Year, I took a couple of common penny Garden Pots, and stoppt the Holes at the Bottoms with Corks; and painted the Pots, and puttyed the Corks, that no Water could filtrate through them; then had a couple of Boards cut to fit the tops of the Pots, bored with seven holes at equal Distances, to place my Bulbs in, and likewise as many small holes for placing of Sticks, to tye the Stems of the Flowers to; I then planted *Hyacinths*, *Narcissus's*, *Tulips* and *Junquils*, and filled the Pots with Water up to the Board, so that the Bulbs stood only upon the Water; where they blowed very well, and made the best Appearance, as I thought, I had ever seen, beyond any Flower-pot that could be dressed by gather'd Flowers.

After the Bloom was over, their Leaves looking green, I set them out in my little Garden, thinking any thing that looked green and made a tolerable Figure, agreeable in a *London* Garden; and not depending on the Bulbs again to be of any service to be preserved, I let them stand till toward Midsummer, and took no farther care, but now and then giving them fresh Water as it perspired or evaporated, and when the Rains fill'd the Pots, I emptied them down to the Boards again; but the Bulbs shrinking, some of them slip'd through the Holes down to the Bottom of the Pot, and about Midsummer, when their Leaves began to grow Yellow, I went with a Design to pull them up and throw them away, I was surpris'd to find that the Bulbs which were buried in the Water were grown firm, and too large to be drawn back through the Holes, being found and fit for blowing the next Year, and increased in Off-sets.

This occasion'd me the next Year (which was the last) to try another Experiment of blowing my Bulbs under Water, which I found answer'd beyond what could be expected, for they rather out-do those that grow in the Ground, in the strength of their Stalks, the clearness of their Blossoms, the lasting of their Bloom, and likewise, the Difference of their Seasons, which may be so manag'd, according to the warmth of the Rooms they are kept in, as to have the same Sorts in flower from *Christmas*, till the natural Time of their Bloom in the open Ground, which is *March* and *April*.

But finding it very troublesome to keep the Boards fix'd under Water, I thought Lead might answer the Purpose better; whereupon, I got some sheet Lead,
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of about four pounds to the Foot, cut fit to my Pot, and made holes in it proportionable to the bottoms of my Bulbs, and likewise small holes to fix sticks for the support of the Leaves and Steins of the Flowers; I put a little coarse Sand in the bottoms of my Pots, thinking it would support the Sticks, and keep them steady; but when I came to make use of the Sticks, the Sand gave way; I then made false bottoms with Lead, and cut Holes opposite to those at the Top, which answer'd my purpose. Upon taking up the Bulbs to put in these false bottoms, I found the Sand had corroded the Fibres, and changed them all like Ironmould, that I thought they were spoil'd; but rinsing them in two or three Waters, it came clear off, and on fixing my false Bottoms, and placing the Bulbs in their holes, and filling them up with fresh Water, they recover'd, and never changed again in the clear Water, but thriv'd and put forth their Flowers very kindly, although by the Experiments which I had tried, before I could fix them right, I had often planted and transplanted them. But I found afterwards that Glass Jars of the Form as represented in the Plate, were the most convenient, both for seeing the Progress the Roots made, and for knowing when they want to be cleaned.

At Fig. I. is represented one of these Glass Jars, containing the following Flowers.

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|-------------------|---|---------------------|
| 1. Golden Sun, | } | <i>Narcissus's.</i> |
| 2. Boffelman, | | |
| 3. Keyfers Jewel, | } | <i>Hyacinths.</i> |
| 4. Pulchra, | | |
| 5. Janus, | | |

At Fig. II. is represented the Profile or Section of the same Jarr.

a. The Sticks to tie up the Leaves and Stems of the Flowers.

b. The upper Lead with Holes to support the *Bulbs* and Sticks.

c. The under Lead with Holes to keep the Sticks steady.

By several Experiments on dried Bulbs, and those that were taken fresh out of the Ground, I find the dried ones do best; for those taken growing out of the Ground, being full of moisture, will not so soon upon changing their Element, be acquainted with a new one; the Fibres they had struck in the Ground, always rot, and they must make new ones in the Water, which makes them require a long Time before they can recover themselves enough to flower. The Bulbs will not rot, yet they will not be so strong as those put into the Water when dry, which fill themselves with moisture by degrees: Therefore, when I plant my Bulbs, I set them at first on the top of the Water; for I found by two or three Experiments, that those planted under Water did not push out their Fibres so soon, nor so strong, as those set upon the Water; the Reason of which I take to be, that they were fill'd with Water too soon, whereas those set upon Water attracted it by degrees, and so made both the Fibres and the Bulbs grow stronger; and then about five or six Weeks after planting them, as the Fibres push out, I by degrees fill the Water higher and higher, till the whole Bulb is cover'd,
and

and so keep them till the Bloom is over, and the Season for drying them returns.

One Observation surpris'd me, *viz.* two of my *Hyacinths* were mouldy, which Mould canker'd and eat holes through several of their Coats or Scales; this I pick'd and clean'd several times, but still it spread farther and farther; but soon after they were covered with Water, I could perceive them heal by degrees, till they became perfectly sound and blew their Flowers as kindly, as those that had continued perfectly sound.

By another Experiment, I tried what Bulbs would do if kept all the Year under Water: I left in water a *Narcissus*, an *Hyacinth* of *Peru*, and several *Juncus*, that were planted in *October*, 1732; which are now as sound and strong, as those I took out and dried, and promise fair for a Bloom; I observ'd that their old Fibres do not rot, till they are ready to push out new ones.

Another Observation seems worthy of Notice; one of my double *Hyacinths*, commonly called *Keyfers Jewel*, brought two Pods of Seed to maturity; which I have blowed for fourteen or fifteen Years successively in the Ground, and could never find them make any thing towards seeding; and I have reason to think that several other Bulbs would have seeded, if I had taken timely care of them, but did not perceive it till too late.

Mr. *Miller*, in *Philos. Transf.* N°. 418. intimates that Bulbs set in Glasses grow weaker, and should be renewed every Year with fresh ones; but I observe by this way of raising them under Water, that at their taking up, they are as large, and some of them

them stronger than when they were planted, and if they be dried at the proper Season, will produce a second Year as well as fresh ones.

I planted likewise *Ranunculos* and *Anemone Roots*, which grew and shot up the Stems of their Flowers very strong, but the Buds of the Flowers were blasted, which I am apt to think happened from their being crowded too much, having no convenience to give them free Air enough.

I also planted *Auriculas* and *Pinks*, the *Pinks* flowered, but the *Auriculas* were not strong enough; they are still both of them growing, and I am in expectation they will blow the next Season.

I have tried also several Shrubs, as *Roses*, *Jasmines*, and *Honyfuckles*; which all grew, and struck out fresh Fibres, and the *Rose-tree* made six strong Buds for Blossoms, but accidentally setting them out in a hot Sun-shiny day in *April*, they were all scorch'd up, that they came to nothing; I observ'd, that strong Suckers cut off two or three Inches under ground, without any Fibres, grew the best.

By another Experiment, I was willing to try what the Succulent Plants would do in this way; I took a Leaf of the *Opuntia* or *Indian Fig*, and laid it by to dry for three Weeks or a Month, till it had lost all its moisture, and was nothing but a dried Skin; I then planted it in Water in the beginning of *July*, and tied it to a Stick that was fixed in one of my Leads, and filled the Pot so, that the Bottom of the Leaf was a quarter of an Inch in the Water; in about a Month's time the Leaf fill'd, struck out Fibres, and put forth a fresh Leaf, which is now growing, and has made as much progress as such a Plant

Plant would do in the Earth, in the same space of Time: I had no opportunity of trying other Succulent Plants.

Dr. *Mortimer* told me he had placed Beans upon Water, which blossomed and podded: This put me upon trying the Experiment with them, and likewise Pease at the same Time. I planted six Beans in a Pot, and fixed sticks in it to support their Stems as they grew; they bloom'd as freely as those which are planted in the Ground, but did not pod so well, having not above a pod or two on each Plant, which came to perfection, and ripened their Seed; but this might happen for want of a little more Experience; the Pease which were of the Dwarf sort, drew a little too much, and only put out three or four Blossoms at the extremity of their Tops, but every Blossom brought a Pease-cod, and ripened its Seed.

This growth of the Beans and Pease, made me imagine that other Seeds would succeed in the same manner, knowing they would chip upon being laid for a little time in Water, or in a moist Place: The only Difficulty was to invent something proper for their support in growing. The first Thing I tried was boring very little holes in a piece of Lead, fix'd in a Pot, and sowing the Seeds thereon; I found they would sprout, but as the Water evaporated, filling in fresh moved the Seeds from their places, that they could not fix themselves to turn their Radicle down into the Water; I then tried Towe or Hemp, and spread it on the Lead, which I found answer the Purpose of supporting the Seed, which by that means grew, and the Radicle taking hold of the Towe, it was enabled to throw up its Plume or Shoot; I then
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tried several sorts of small Seeds, and found they would all grow ; tho' I made the Experiment about *Chriftnas* ; but I found the Towe discoloured the Water, and gave an offensive smell, and that the Seed did not thrive kindly : I then tried Wool and Cotton, the Cotton being too boyant, would not so well answer the Purpose ; but Wool, when it is just buried in Water, being like a Jelly, and not drying so soon on the Top, even though the Water has left it, intirely answers the Purpose as well as sowing them in the Earth ; and if the Seed be good, will keep clean for two or three Months ; for this way of sowing will discover whether the Seed be mixed with old Seed (as those bought at a Seed-shop generally are.) I sowed several sorts of Sallad-Seeds in this way, and they came to as great perfection as those of the same kind raised in Hot-beds : and thus they may be produced in any Room or Garret, early in the Spring, and so on till late in Autumn, till the cold Weather comes in, and afterwards in the middle of Winter, in a Room where a constant Fire is kept. I had several Sallads last Spring, and this Autumn, by sowing different sorts every Week one under another, in small half-penny Pots ; as *Lettice*, *Cresses*, *White Mustard*, *Rape*, and *Raddish*, which in a Fortnight after sowing would be fit to cut ; so that keeping a proper Succession, I had every Week a tolerable Sallad for two or three Persons.

My way of sowing of these Seeds, is to have a piece of Lead bored full of holes, and made to fit the Pot, about half an inch below the Top ; then filling it with Water, I take a little clean Wool, and spread it even and thin, upon the surface of the Lead,
quite

quite home to the sides of the Pot, which will then look like a Jelly; if there is too much Water, I pour it off, till the Wool only appears cover'd or fill'd with Water; then I sow the Seed pretty thick, and in forty-eight Hours it will begin to chip, and in a Fortnight after sowing will be fit to cut for a Sallad.

I observ'd from several Experiments, that any of these Plants transplanted out of the Earth into Water would not thrive kindly; but those rais'd in Water may be transplanted into Earth, so that this Method of raising Seeds in Water may be of use in a dry Season, to be pricked out into the Earth, though they will not come up in such a Season, if sowed in the Ground, yet transplanted from Water they will take as freely to the Earth as if rais'd in it.

I don't know but from the foregoing Experiments in Water, we may come at a better Way of planting in the Earth, especially some Roots, which are apt to rot in the Ground, as *Anemones*, *Ranunculos*, and *Hyacinths*: from an Observation I have frequently made, but never before took notice enough to improve it, which is, that I have often seen a Bulb drop'd by chance upon the Ground, strike out Fibres stronger and more numerous than those planted in their usual depth of Earth would do. The use I would make of this Observation, is, that when I plant my Bulbs, I take out the Earth of the Bed, I design to plant, as deep as the Bulbs or Roots are to stand when planted, and place my Bulbs on the Surface, till the moisture of the Earth shall have attracted their Fibres, and they begin to shoot up their Plume, and then by degrees I cover them over to the thickness of Mould, that they should stand in, by which means they will be in no danger of rotting after they have got strong

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Fibres

Fibres; for when we plant these Bulbs or Roots, it is generally either too wet or too dry; if it be a wet Season, the Bulbs are too soon saturated with Moisture, which rots them; and if it be too dry, they lie so long, before they can attract Moisture enough to make them Vegetate, that they grow mouldy, and are render'd dry and hard as a piece of Stick, so that the first Rain infallibly rots them.

N. B. These Experiments were made without the Benefit of any Sun, all my Windows having a *Northern Exposition*.

As these Experiments have open'd a new Scene of Knowledge in the Vegetable World, and may be of great Use in Natural Philosophy, and particularly improve the Art of Gardening; its to be hoped the Curious will carry on the Inquiry as they have Leisure and Opportunity.

Directions for Planting Bulbous Roots in Pots or Glasses of Water.

When the Leaden false Bottoms are fix'd down tight, within two or three Inches from the Bottom of the Pots (which is only design'd to hold the Sticks steady that are to support the Leaves and Stems of the Flowers) lay on the Lead, which is to support the Bulbs, placing the notched Part opposite to that in the false Bottom, as near as the Sticks when placed will suffer it; then place your Bulbs in each Hole, and fill in Water up to the Lead, which will then touch the Bottom of the Bulb, and as the Water
 evapo-

evaporates or perspires, keep it fill'd to that height, till the Bulbs have struck their Fibres pretty strong into the Water, which may be in a Month or six Weeks ; then fill in Water about half an Inch above the Lead, and by Degrees as the Fibres strengthen, and the Plume or Head sprouts, fill it higher and higher till the Bulbs be intirely buried under Water, which must be continued till the Season for drying them returns.

But you must observe at the Planting the Bulbs to clean them very well from any Foulness they may have at their Bottoms, by scraping them with the Point of a Knife, till the sound part of the Bulb appears, and likewise clear them of all their loose Skins, and even the brown Skin, till they appear White ; which otherwise will discolour and foul the Water that should be kept as clear as possible ; and for this Reason, the Notches in both the Leads are contriv'd, that upon shifting all the Water out of the Pots, if there happens to be any Sediment, by shaking the Pots once or twice as it is pour'd off, all the Foulness may come with it ; but this shifting of the Water need not be done but once or twice in a Winter, or when ever you see occasion by the Discolouring or Foulness of it ; and at the same Time it will be necessary with a Painter's Brush to clean off all Slimy-ness that will adhere to the Sides of the Pots and Bulbs, and rince them well, by pouring Water on them at a little Distance : By this method they may be kept perfectly clean ; and at any time when the outward Skins of the Bulbs loosen and begin to decay, clear them off, which otherwise would occasion Foulness ; and when ever you see Dust swimming on the surface

of the Water, fill the Pot full, and let it run over, which will carry it all off, and then pour off the Water to its usual height.

N. B. Plant Bulbs of equal bigness, at least in height, together in the same Pot, that they may have the same Benefit of the Water; therefore I plant *Narcissus* and *Hyacinths* and Bulbs of that size together; *Tulips* and *Funquils*, &c. by themselves; and *Crocus* and *Snow-drops*, &c. by themselves.

Bangor-Court, Shoe-Lane,
Decemb. 19; 1733.





Fig. I

Fig II

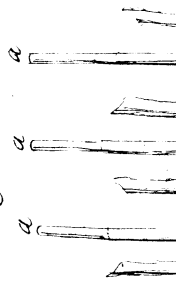




Fig. II

